



JWST Observatory & Commissioning

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JWST Observatory Project Scientist
March 18, 2016





Overview



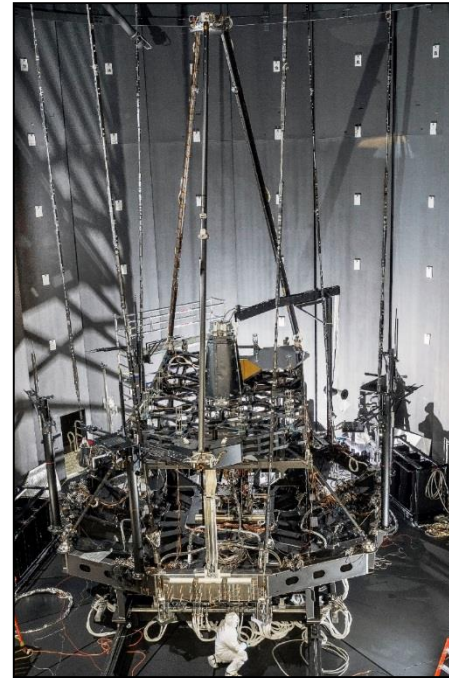
- ◆ Acrylic Adhesive Recap
- ◆ Reaction Wheel Update
- ◆ OTIS System Integration
- ◆ JWST Commissioning



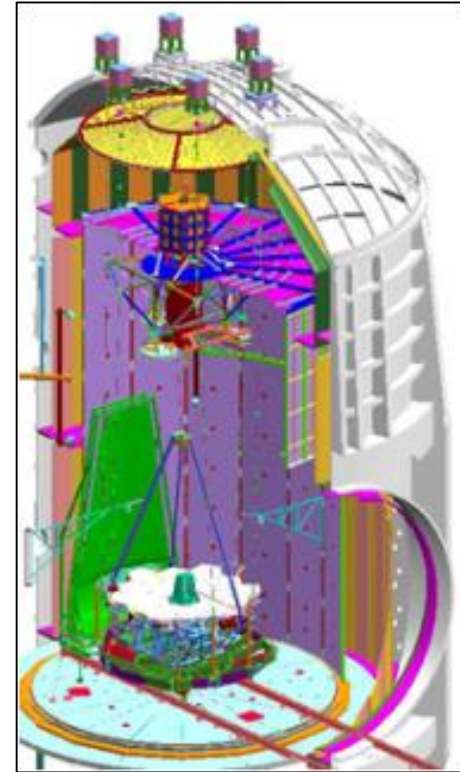
Tertiary Cleaning & Adhesive Particles



- Flight tertiary mirror (TM), part of the AOS, was successfully cleaned following the OGSE-2 test.
- Comprehensive review of the the TM particulates led to identification of acrylic adhesive particles, which was not seen before.
- Several adhesive particle source containment efforts were successfully completed which then enabled the AOS installation.
- Observatory reach-across efforts underway to identify and mitigate future susceptibility to acrylic adhesive particulation.



JWST Pathfinder configuration
for OGSE-2 inside JSC's
Chamber A (2015)



JWST configuration for OTIS
cryo-test inside JSC's Chamber A
(2017)

*See full adhesive review on NGIN here:

[https://ngin.jwst.nasa.gov/displaydoc.asp?RevisionNum=LATEST
&doc=029351.pptx](https://ngin.jwst.nasa.gov/displaydoc.asp?RevisionNum=LATEST&doc=029351.pptx)

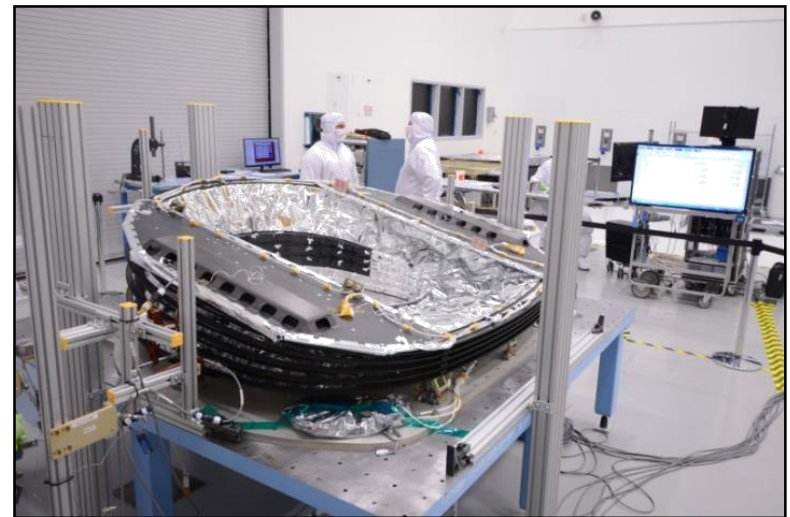


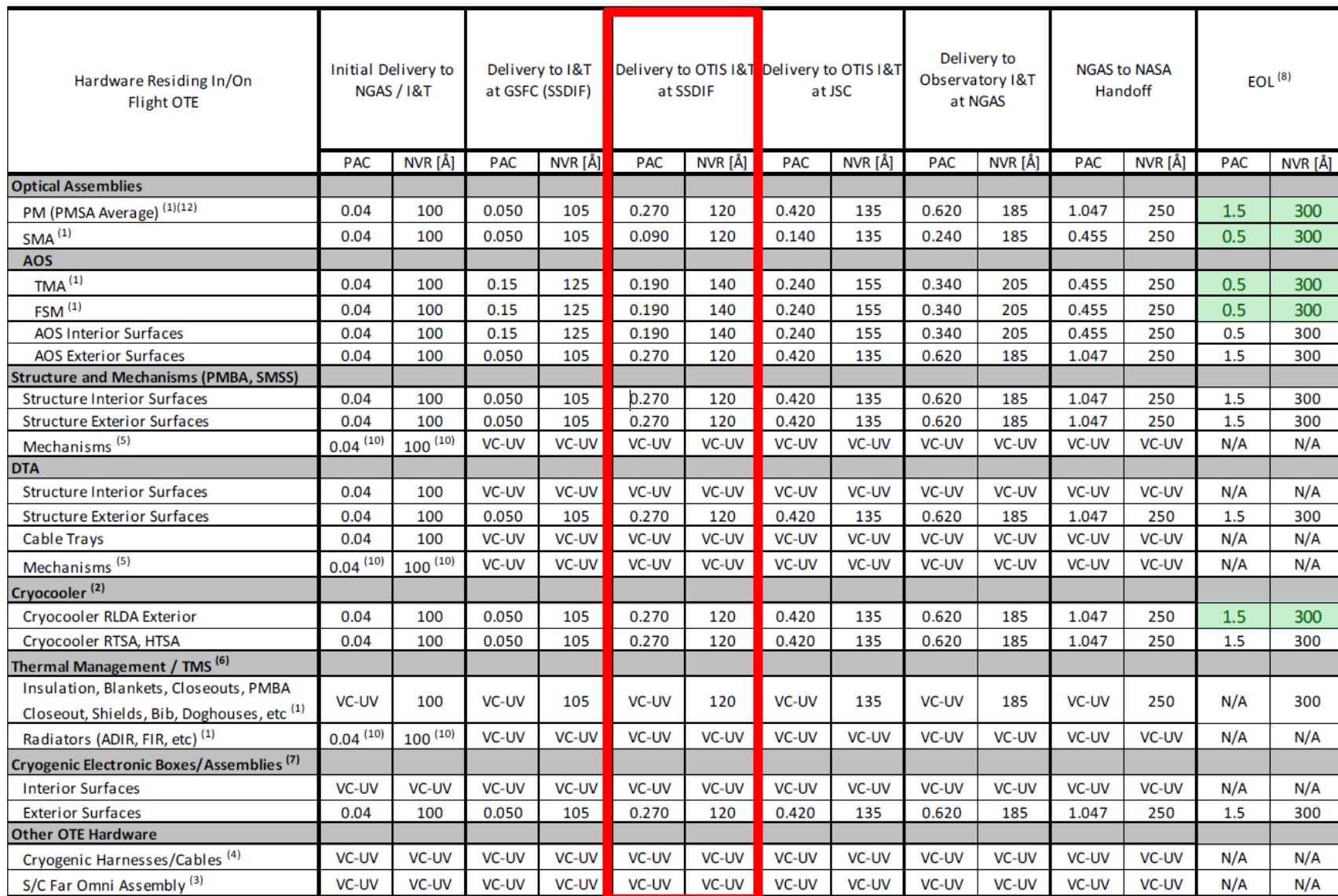
Acrylic Adhesive Observatory Reach Across



- Cross-discipline NGAS team meeting twice per week to assess acrylic foreign object debris (FOD) across the Observatory
 - Hinge joints, sensors
 - Core2
- Detailed inspection of JSC facility on-going
 - ACF, USF, PG cameras, SMSS, CMUs
 - Thermal Pathfinder will be visually and photographically inspected before and after the test for adhesive fallout.

JWST Flight Core at NGAS/M2







OTE & ISIM Complete → On to OTIS



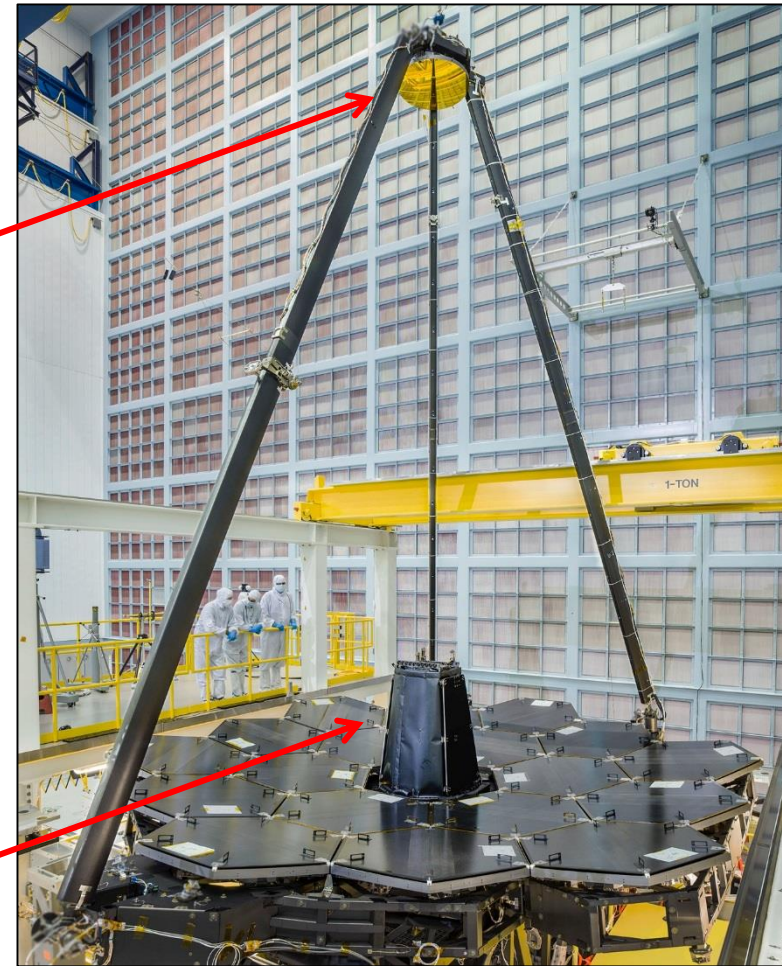
- The OTE integration now complete.
 - Flight OTE completed on March 8, 2016.
 - ISIM Pre-ship Review from March 8-10, 2016
- Primary mirror comprised of 18 segments completed on February 2, 2016
- Secondary mirror installed on February 29, 2016.
- Aft Optics Subsystem installed on March 6, 2016.



Secondary Mirror Installation



Aft Optics Subsystem



JWST OTE

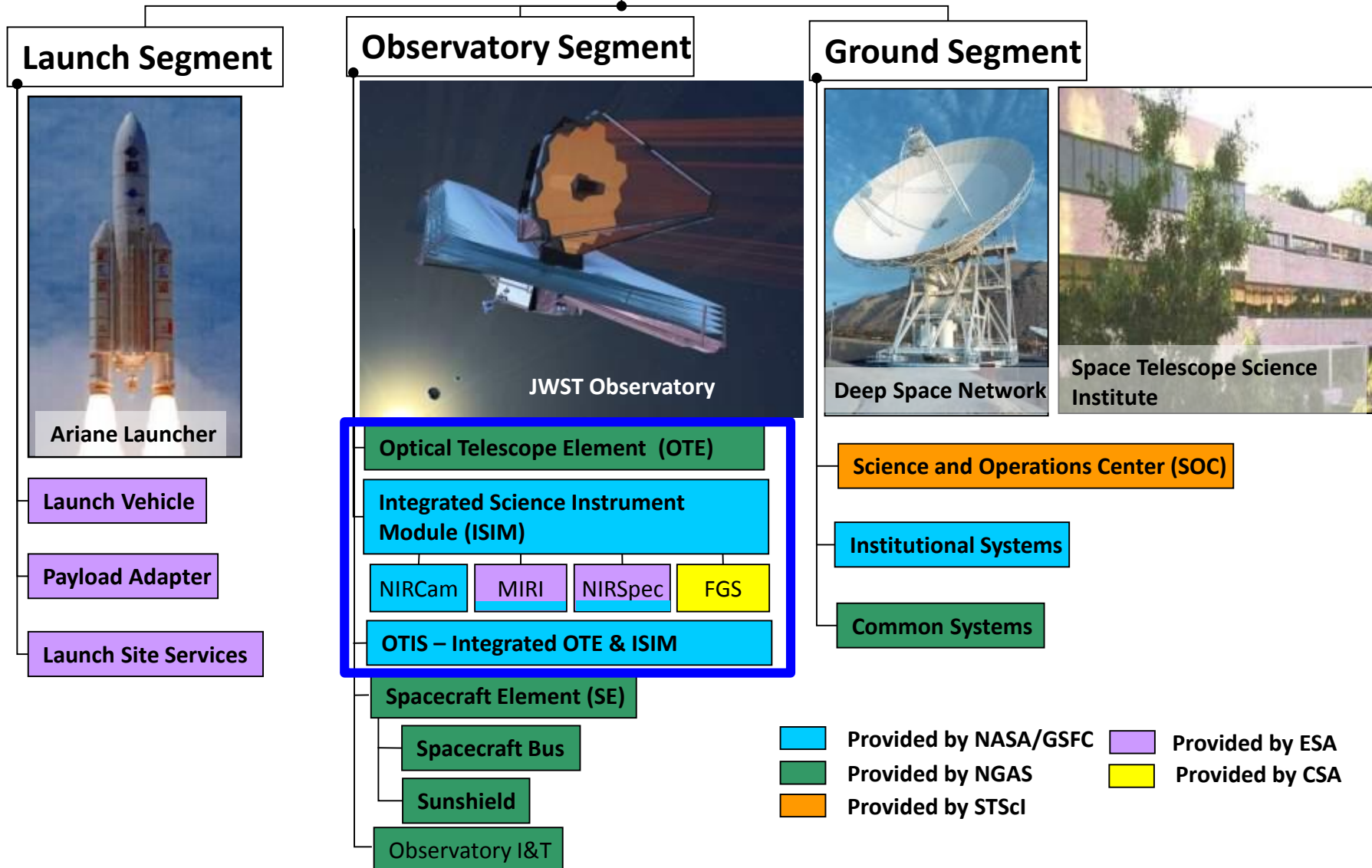


JWST/OTIS Responsibilities



James Webb Space Telescope System

Mission Systems Engineering





OTE Architecture



Secondary Mirror Support Structure (SMSS)

- Deployable four-bar linkage strut assembly
- M55J composite tube struts

Aft Optics Subsystem (AOS)

- Fixed tertiary mirror
- Fine steering mirror
- Baffle and pupil mask

Electrical Subsystem

- 21 cold multiplexer units
- Cold junction box
- Fine steering mirror control electronics

Thermal Management Subsystem (TMS)

- Honeycomb panel +V3 radiators
- ISIM enclosure (MLI)
- Backplane support frame floor (MLI)
- Aft deployable ISIM radiator

Secondary Mirror Assembly (SMA)

- Monolithic light-weighted Be mirror
- Hexapod actuators for 6 DOF rigid body control for wavefront sensing and control (WFS&C)

OTE Primary Mirror
Collection Area > 25 m²

Primary Mirror Segment Assembly (PMSA)

- 18 monolithic light-weighted Be mirrors
- Hexapod actuators for 6 DOF rigid body control (WFS&C)
- Actuator for ROC control (WFS&C)

Primary Mirror Backplane Assembly (PMBA)

- M55J composite tube frame construction
- Fixed center section with torque box design
- Two deployable wings

Thermal Management Subsystem

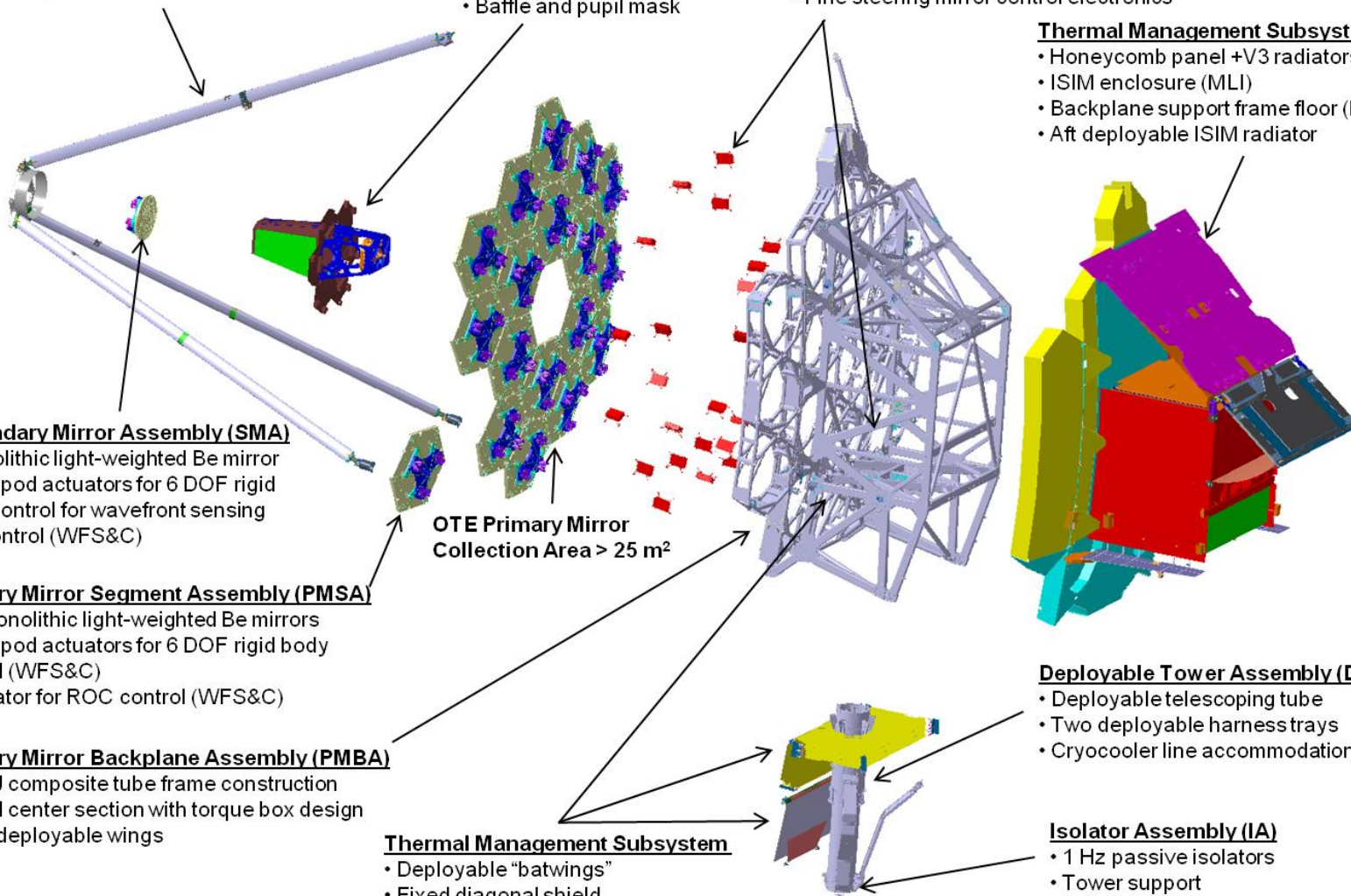
- Deployable "batwings"
- Fixed diagonal shield
- Deployable stray-light "bib"
- PMBA thermal management (SLI)

Deployable Tower Assembly (DTA)

- Deployable telescoping tube
- Two deployable harness trays
- Cryocooler line accommodation

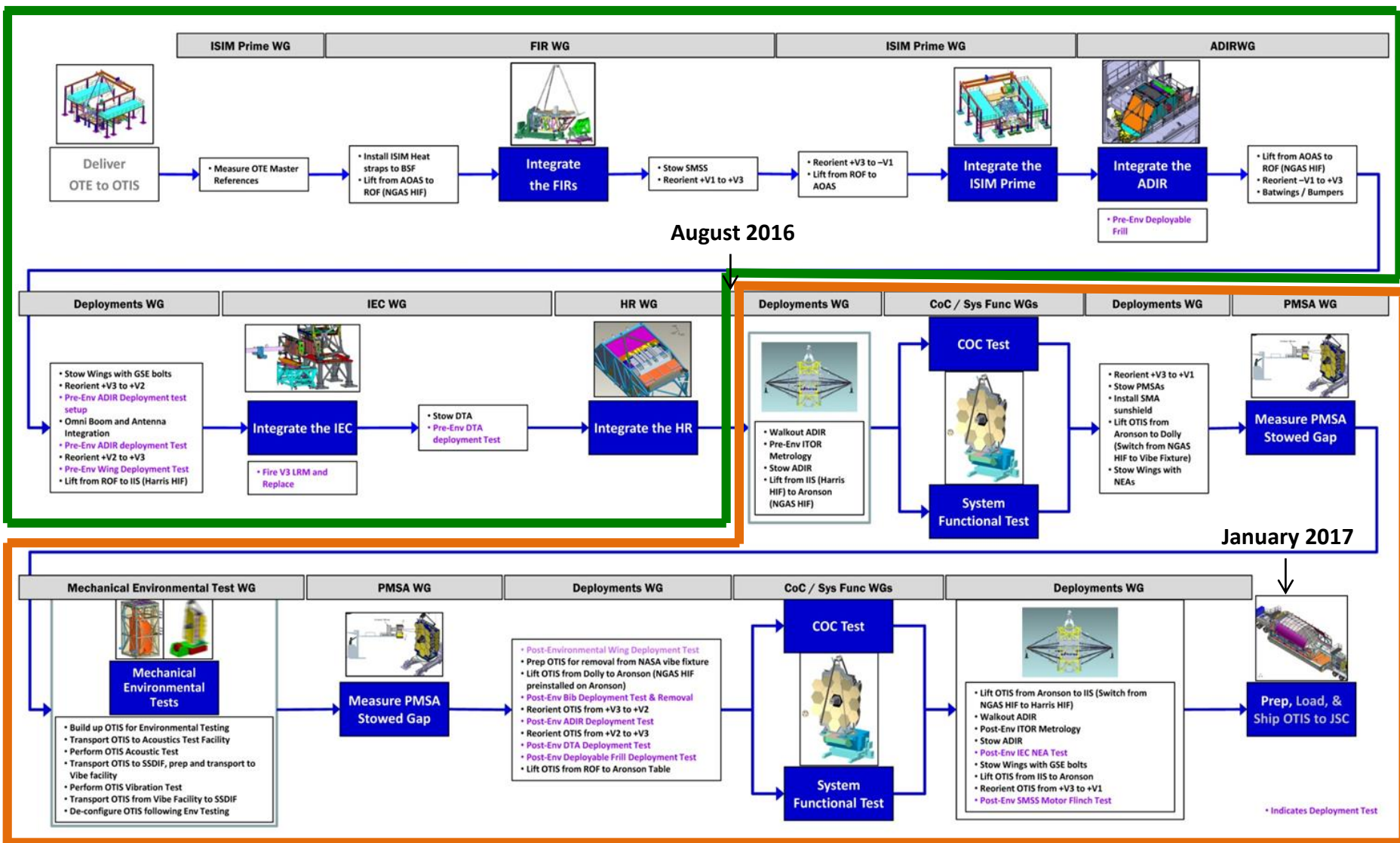
Isolator Assembly (IA)

- 1 Hz passive isolators
- Tower support





OTIS Integration & Test @ GSFC

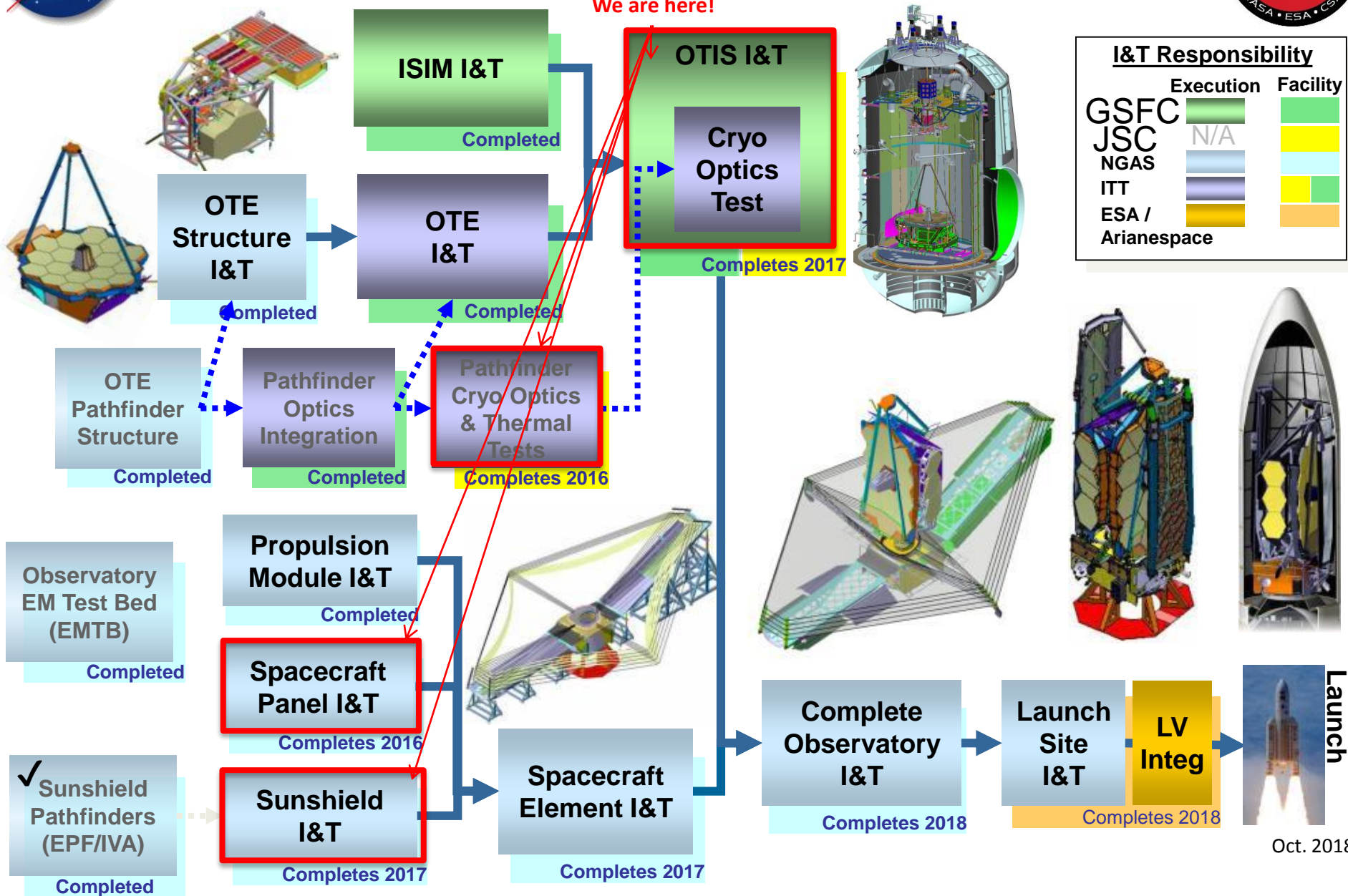




JWST Integration & Test Flow

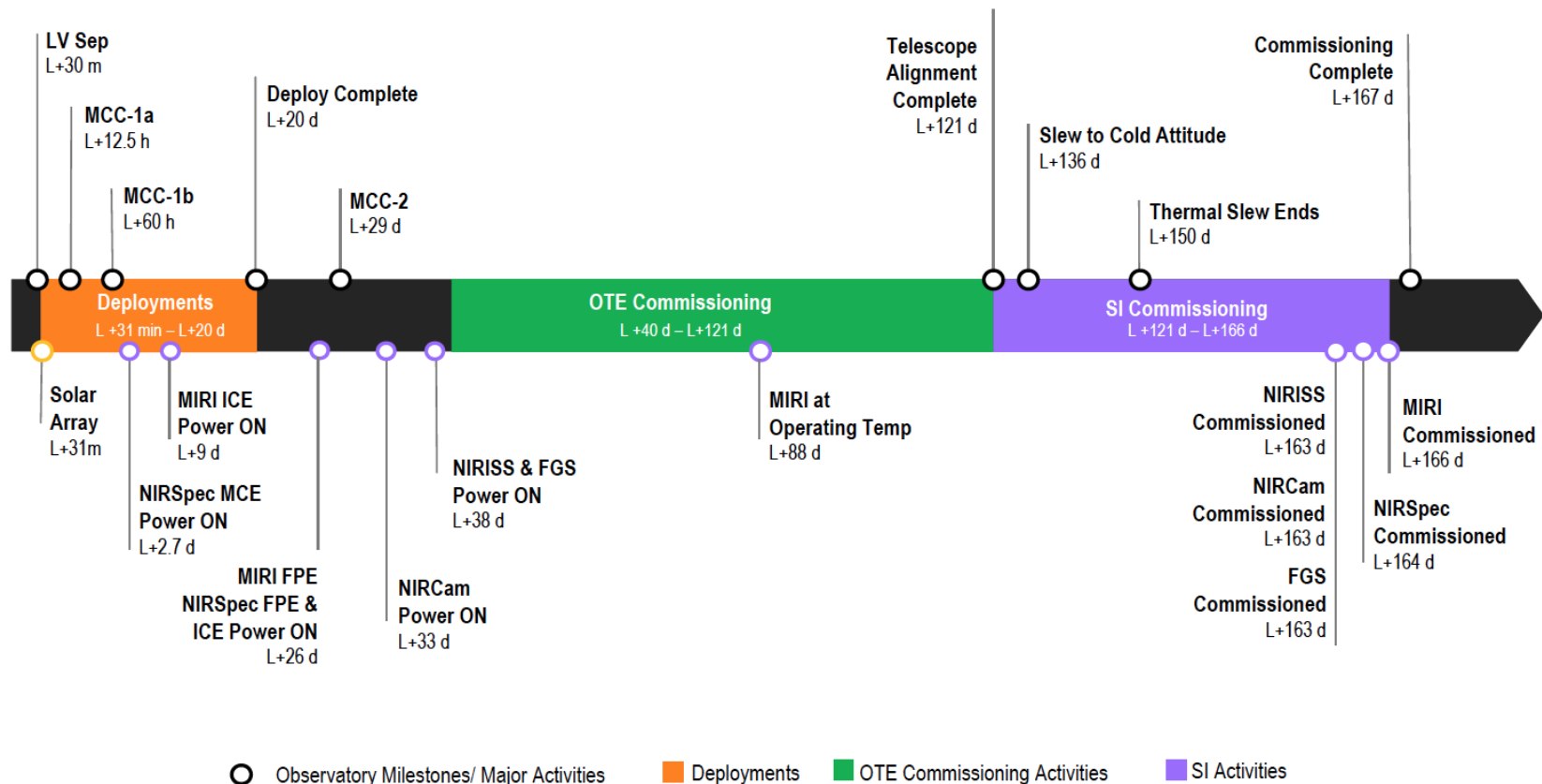


We are here!





JWST Commissioning: 2015 Timeline

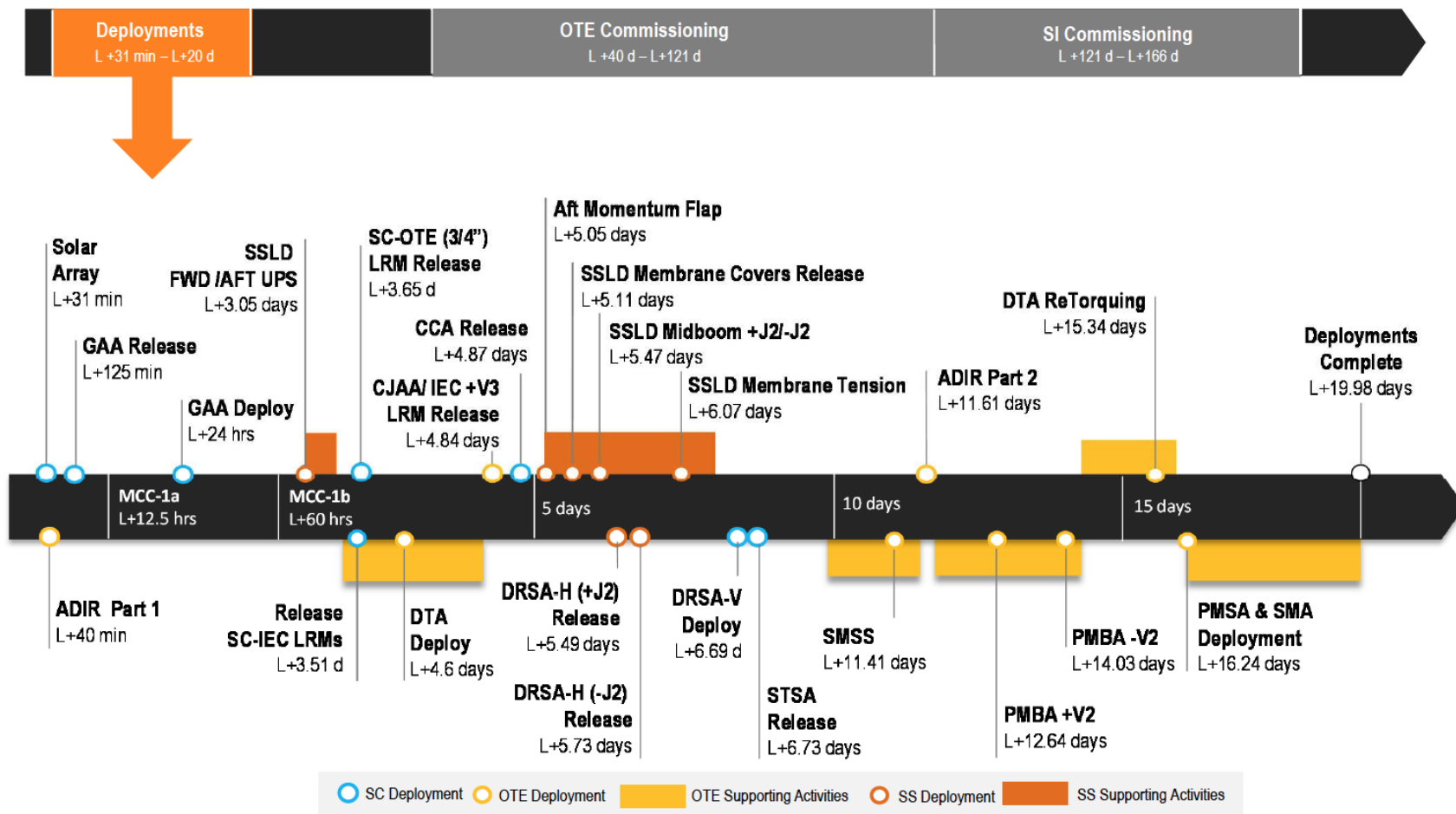


thermal analysis: v5.3j_fixVDA1_trCool4 Cool2014b ISIM Contam

Commissioning Timeline Working Group Lead: Andria Welsh (NGAS)



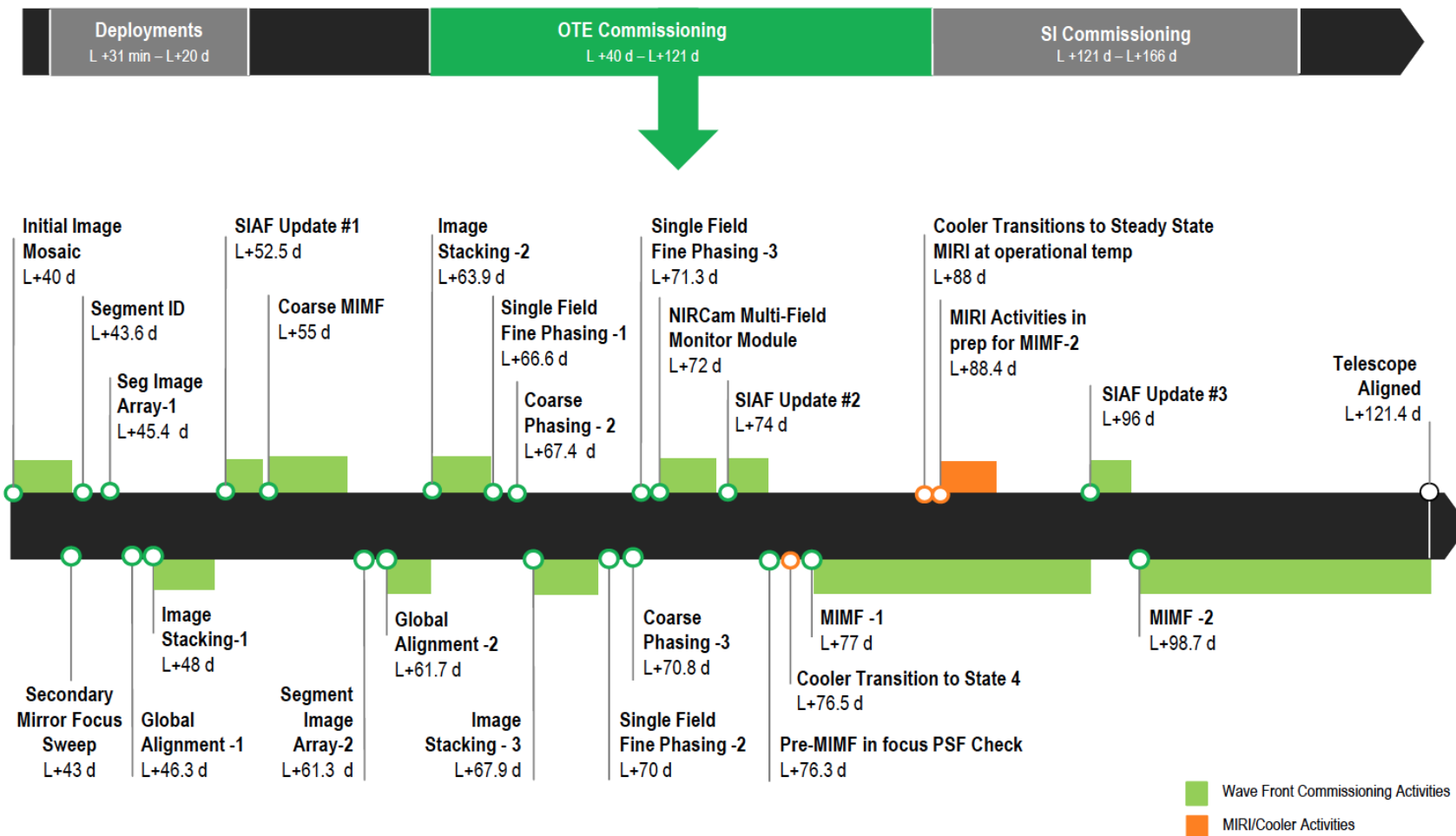
JWST Commissioning: Deployments

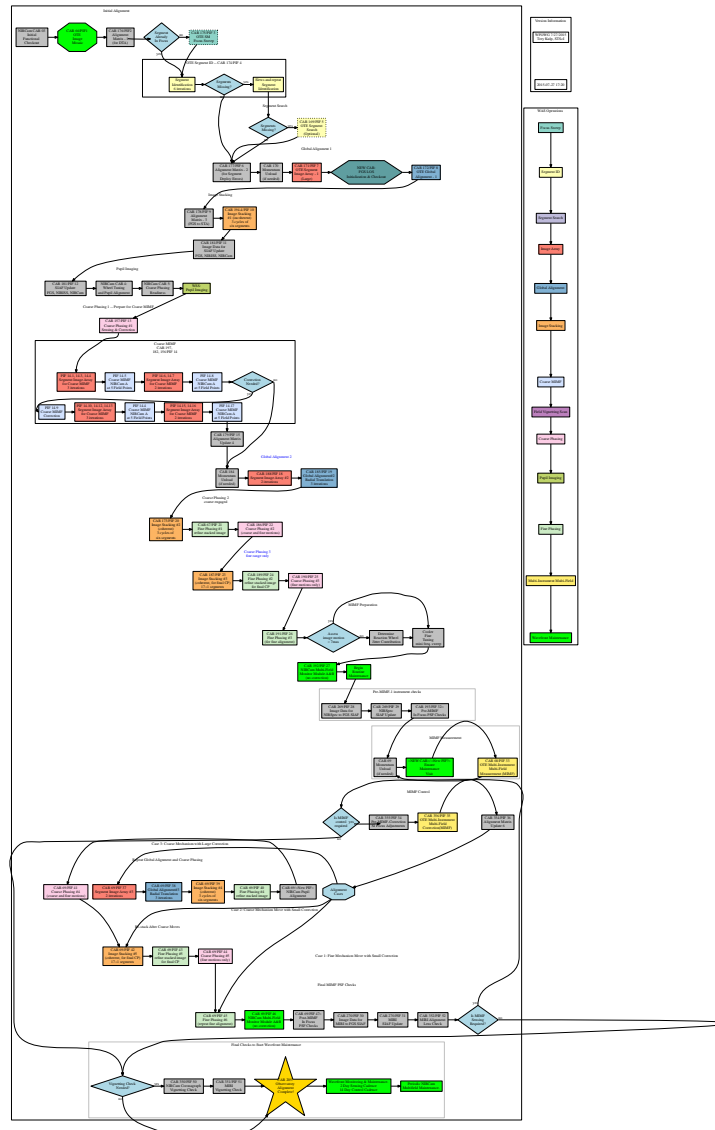


*See NGAS deployment video here: <https://www.youtube.com/watch?v=bTxLAGchWnA>



JWST Commissioning: OTE Baseline

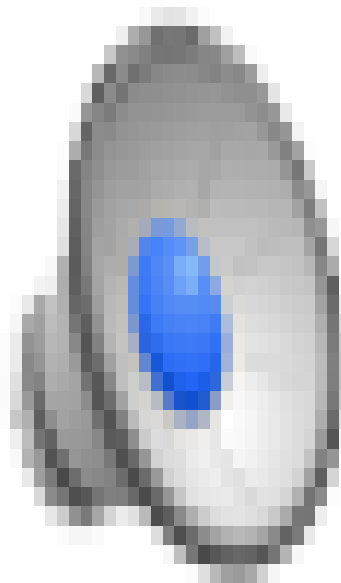




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JWST Commissioning: ITM

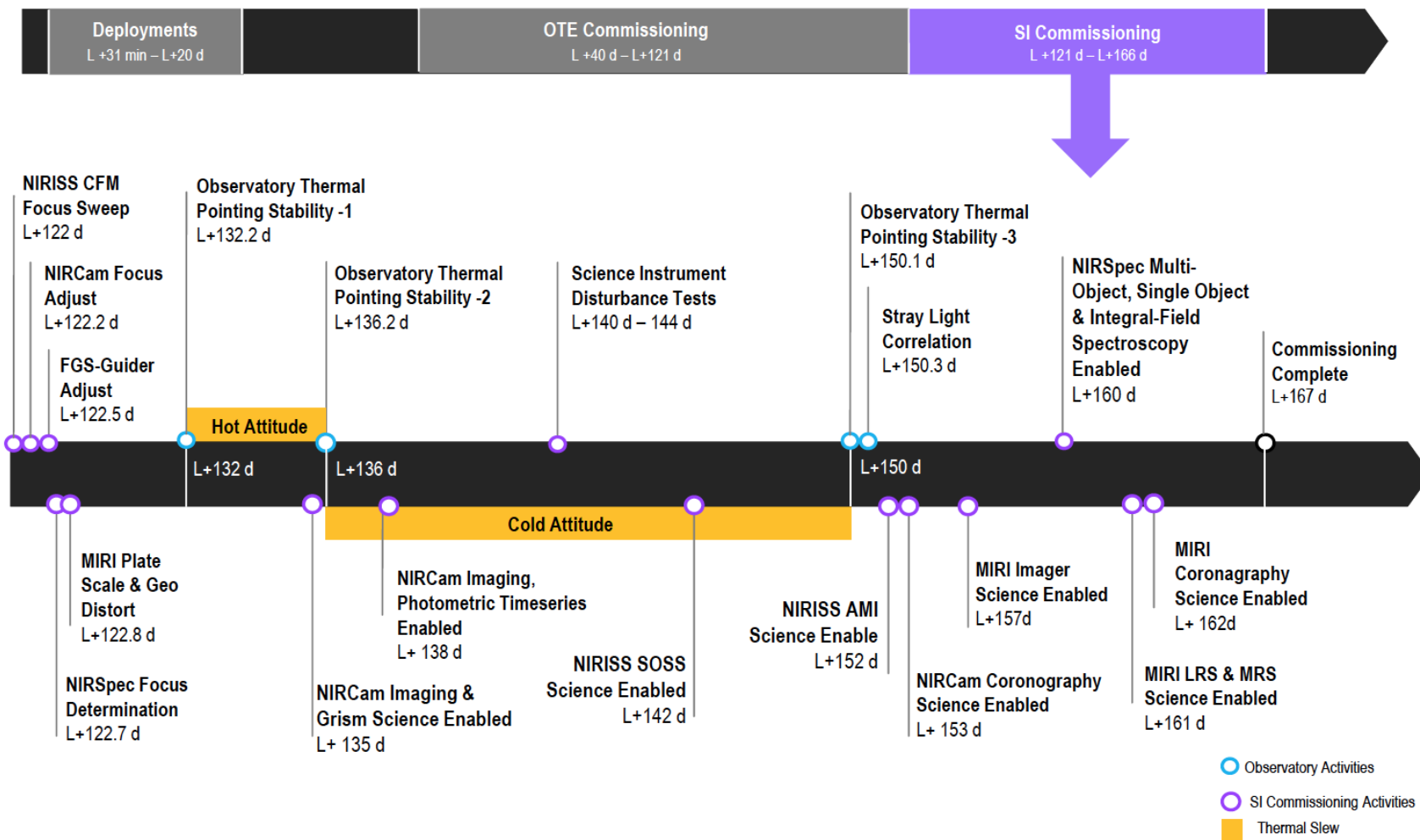


OTE commissioning sequence as seen by NIRCam A3. This simulated data was made using the Ball Aerospace provided Integrated Telescope Model. These early OTE commissioning simulations are used to exercise the wavefront sensing and control software subsystem.

Movie credit: Charles-Philippe Lajoie (STScI)



JWST Commissioning: SI Commissioning





Thermal Slew CAR

- Objectives
 - Measure and characterize the JWST thermal profile to 1) validate observatory thermal models and 2) determine WFSC update expectations.
- Activity Description (~14 days, after MIMF)
 - Point in a hot/cold direction and thermally stabilize observatory (~4 days) followed by a large slew (~50 deg pitch) and monitor the observatory as it thermally stabilizes at the new cold/hot pointing (~14 days)
 - Observables: wavefront drift via NIRCam WFS, pointing stability from star tracker support assembly, telemetry data from the observatory, heater sensors, transient behaviors



<http://www.stsci.edu/jwst/overview/design/field-of-regard>